

Environmental Assessment Report

Summary Environmental Impact Assessment
Project Number: 39364
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Pakistan: Barani Integrated Water Resources Sector Project

Prepared by Punjab Irrigation and Power Department for the Asian Development Bank (ADB).

The environmental impact assessment is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

CURRENCY EQUIVALENTS

(as of 30 September 2007)

Currency Unit	–	Pakistan rupee/s (PRs)
PR1.00	=	\$ 0.0164
\$1.00	=	PRs60.71

ABBREVIATIONS

ADB	–	Asian Development Bank
BIWRSP	–	Barani Integrated Water Resource Sector Project
CCA	–	cultivable command area
EIA	–	environmental impact assessment
EMP	–	environmental management plan
EPA	–	Environmental Protection Agency
IEE	–	initial environmental examination
IPD	–	Irrigation and Power Department
FO	–	farmers' organization
KFK	–	Kot Fateh Khan
O&M	–	operation and maintenance
MCM	–	million cubic meters
PIU	–	project implementation unit
SDO	–	small dams organization
SEIA	–	summary environmental impact assessment
SEMU	–	Social and Environmental Monitoring Unit
WPD	–	watershed development plan

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I. INTRODUCTION

1. Today, the agriculture sector in Pakistan still accounts for 20% of the gross domestic product (GDP) and remains the largest source of household income for 38 million people. For the country to be able to sustain the current high overall economic growth rate, the agriculture sector needs to increase its growth rate from the 2–3% observed over the last decade. With an average rainfall of 240 millimeters (mm) per year, Pakistan agriculture is heavily dependent on the Indus River Basin irrigation system which produces over 90% of the total crop output. Yet about one quarter of the country's cultivable area remains outside this system and suffers from chronically low agricultural productivity. In Punjab, these *barani* (rain-fed) areas, known locally as the Potohar where the project is to focus, accounts for 18.6% of the total cultivated land in the province.

2. Agriculture and livestock have been the traditional sources of revenue for the people living in barani areas and still account for 40% of their income in Punjab. With the increasing fragmentation of landholding due to population growth and little progress in improving agricultural productivity, a vast portion of the population has been gradually moving to the off-farm sectors for livelihood opportunities, mainly through temporary migration abroad or to the cities.

3. Remittances sent by these migrants have become the second most important contribution to *Barani* household incomes and now play a key role in supplementing agriculture incomes to sustain the local economy. Although, migration may appear as a suitable and necessary strategy for some of the excess labor force, barani areas still remain home to many people. Improvement of their income, especially for a large majority of small land holders and tenants, will depend to a large extent from gains in agriculture and livestock productivity and growth in the local non farm sector.

4. The major constraint affecting the agricultural and livestock productivity of the barani area is a shortage of water. With no or very few secured water sources, farming becomes exclusively dependent on rainfall, which is irregular in both annual and seasonal amounts, as well as its intensity in any given storm event. The barani area is especially prone to drought and consequent crop losses and failures. Farmers have developed specific farming systems with very low input requirements to keep the financial risk of crop failures manageable. Despite some improvements through the introduction of a few drought-resistant wheat varieties, crop yields remain typically 40–50% lower than those in irrigated agriculture. Acute susceptibility to prolonged drought is exacerbated in the absence of reliable surface water or groundwater sources.

5. Significant gains in agriculture and livestock productivity and related economic growth can be obtained through water resources development, but for which little investment support has been made available to date. With suitable topography and rainfall, the best option appears to be the development of water storage by constructing small and medium-sized dams. The Barani Integrated Water Resources Sector Project (BIWRSP) aims at increasing the agricultural productivity and farmers livelihood through enhanced security of water supply for irrigated agriculture, domestic water supply and other livelihood options.

II. OVERVIEW OF THE SECTOR PROJECT

A. Project Components

6. The proposed BIWRSP will contribute to sustained long-term social and economic development and reduced drought vulnerability in Punjab's Potohar Plateau and will have the

following components: (i) integrated water resource infrastructure development; (ii) demand-driven irrigated agriculture development and water use; and (iii) project planning, implementation and institutional support.

7. New water storage dams will be constructed together with initial conservation measures in the watersheds. However, watersheds of selected existing reservoirs will also be treated. Command area works for both existing and new dams will be undertaken and an irrigation management transfer of the operation and maintenance (O&M) of the water distribution infrastructure will be made to the water users, along with active support and services, for adopting remunerative irrigated agriculture. It is expected that 15-20 small to medium-sized dam projects will be constructed as part of the project.

B. Integrated Water Resource Infrastructure

8. The component for developing an integrated water resource infrastructure will provide financing to construct new small dams and reservoirs, in tandem with conservation measures in the watershed, and the main water carrier channel infrastructure. Watershed conservation measures will have positive environmental and socio-economic impacts. Land acquisition and resettlement must be completed before construction can start. During dam construction the site will be subject to large-scale construction activities. A workers camp and the impoundment area will be cleared of vegetation. Construction materials will be collected from quarries. Main canals will also be constructed as part of the water resource infrastructure. The alignment of the main canal will cut across the landscape and fields. The majority of these fields will belong to beneficiaries of the irrigation system. The watershed conservation measures consist of awareness raising and capacity building, structural measures for erosion control and sediment trapping, vegetative measures, and conservation farming measures.

C. Demand-Driven Irrigated Agriculture and Water Use Development

9. The component for water use and development of irrigated agriculture aims to increase the income of agricultural households and enterprises, facilitate project ownership for all stakeholders, ensure sustainability of O&M of investments in the command area, minimize "elite capture" and asset inequities, and realize the irrigation potential of the reservoir. This component will include intensification of agriculture, more external inputs, and irrigated agriculture. Corresponding attention and precautionary measures for safe use of agro-chemicals, integrated pest management, and proper irrigation water management and drainage are required.

10. The component is designed to achieve multiple goals where a demonstrable demand exists, with the close involvement and ownership of beneficiaries through cost and component sharing of a minimum of 20% on infrastructure elements. The small dams organization (SDO) will be assisted to organize water users into farmers' organizations (FOs) under the Provincial Irrigation and Drainage Authorities (PIDA) Act and transfer O&M responsibility to the FOs on both existing and new locations. Proposals for funding under the component will be generated in the form of Command Area Development Action Plans (CADAP).

III. ENVIRONMENTAL ASSESSMENT OF SECTOR IMPACTS

11. The BIWRSP is designed to provide the SDO Punjab with the financial means and technical assistance to develop a number of small and medium-sized dam projects in the Potohar region. Improvements in the current practice are a change toward structural inclusion of

participatory approaches during the identification and design stages, inclusion of watershed conservation measures, more emphasis on command area and irrigated agriculture development, and aiming for beneficiary participation in managing and operating the water distribution infrastructure. This means an overall participatory approach to increase local ownership. Investment in the watershed will lead to longer economic lives of the reservoirs and development of the cultivable-command area (CCA) will improve economic viability. Environmental criteria will also be used in the early stages of identifying and selecting subprojects. Environmental assessment and implementing environmental management plans (EMP) will be mandatory for each subproject; the scope will be defined in the selection process. Capacity building, the third component, will develop capacities in the SDO for managing and institutionalizing these approaches.

12. For assessing the sector-level impact from the environmental perspective, the following aspects are relevant:

- (i) the environmental impact of a number of small dam projects in the target area on Potohar Plateau, i.e., the relative magnitude of the subprojects and their potential environmental impacts;
- (ii) possible cumulative impact of a number of small dams in single watersheds; and
- (iii) the impact of the new approaches on the environmental assessments and environmental management of the subprojects.

A. Project Area and the Relative Magnitude of the Subprojects

13. The project will operate on the Potohar Plateau in the districts Jehlum, Chakwal, Rawalpindi, and Attock. Key data on the provinces and the districts are shown in Table 1 to indicate the relative magnitude of the project and the potential subprojects. The overall target area covers in total about 22,000 square kilometers (km²). In Punjab, 41 small dams have already been developed, with an average catchment of 34.5 km² and an average CCA of 431 hectares (ha) or 4.3 km². This totals approximately 1,415 km² watershed and 176 km² command area.

Table 1: Areas of the Selected Districts and Their Populations

No.	Name	Area (km ²)	Population census As of 02 Mar 1998
A.	Punjab	205,345	73,621,290
1.	Attock District	6,857	1,274,935
2.	Chakwal District	6,524	1,083,725
3.	Jhelum District	3,587	936,957
4.	Rawalpindi District	5,286	3,363,911
B.	Subtotal Four Project Districts	22,254	6,659,528
C.	Percentage of Province	10.8	9.0

Source: <http://www.xist.org/cntry/pakistan.aspx>

14. The main land use in the potential subproject areas on Potohar Plateau is rain-fed agriculture with settlements and infrastructure well distributed throughout the area. The natural environment has largely disappeared under the pressure of agriculture and through intensive use of natural resources for fuel collection and for grazing.

15. Community water storage subprojects consist of the reservoir and corresponding watershed and a command area. Watersheds are in the magnitude of 30 to 450 km², but on average will not exceed 100 km². With about 15 to 20 subprojects for watershed development

the maximum areas covered are expected to cover 1,000 to 2,000 km², which would represent less than 10% of the total area. Catchments in Potohar are mainly rainfed agricultural areas, interspersed with barren lands, rangelands and some forests or plantations. Watershed conservation measures are anticipated to have environmental benefits and so watershed development activities are not anticipated to have any significant environmental impacts. Covering a large number of watersheds would put a large area under more sustainable land use and natural resource management.

16. The subprojects will also develop reservoirs for water storage, or will be related to existing reservoirs in the districts. The subprojects therefore relate to the hydrology of approximately 10% of streams and water flow in the area. Site specific environmental assessments will be conducted to prepare adequate EMPs with sufficient environmental safeguards for the subprojects, especially during the construction phase, where environmental management of the construction sites, quarries for construction materials, transport routes for materials, and work camps must be well implemented. The impact on hydrology and reduction in flow will be specific for each site and each dam, and needs to be calculated for each reservoir to develop operating regimes that minimize possible negative downstream flow impacts. This will be undertaken by the consultant who completes the feasibility study. Reservoir areas can be from 5 to about 500 ha (0.05 to 5 km²). The average impounded area for 107 potential small dam sites in Punjab was 58 ha only, with only three reservoirs having areas of more than 200 ha. The construction of small dam reservoirs in the Potohar will create different habitats and may affect the microclimate, and are likely to attract more species and so will be positive in terms of landscape value and biodiversity. Loss of assets and resources in the impoundment areas will be local and will be addressed in the individual land acquisition and resettlement procedures (LARP) for the subprojects.

17. Criteria on protected areas, protected species, important infrastructure, and cultural heritage will be implemented during subproject selection and will ensure that any sites with potential adverse impacts will be rejected.

18. Command areas for subprojects are up to 2,024 ha (5,000 acres) or 20.24 km². The total for each province is about 12,000 ha, or 120 km² CCA development. This is only about 0.54% of the district areas and therefore relatively insignificant. Punjab Province has about 68% cultivable area, meaning that in those districts the subproject CCA is estimated to be about 0.79% of the arable land, as compared to already about 176 km² of existing CCA covering about 1.17% of the cultivable land in these districts. The relative area with changed land use is therefore limited, but since the change to irrigated agriculture has the potential to see the introduction of pesticides and fertilizers there is the potential for their incorrect use to result in impacts on the environment. In order to ensure that the introduction of irrigated agriculture isn't accompanied by the introduction of damaging and unsustainable practices there is a need for an intensive program of farmer education. The farmer education program will be undertaken by CABI, an organization that is internationally recognized as a leader in the delivery of extension services. The education program will deliver training on integrated crop management, integrated pest management, biological control, correct techniques for land leveling and efficient use of water. This will be delivered through a number of mechanisms such as farmer participatory technology development and dissemination and farmer field schools.

B. Cumulative Impacts

19. The cumulative environmental impacts were assessed in two stages. First, the cumulative impacts of a number of small dams in a watershed were assessed; their impacts can

be directly mitigated or managed by the project. The Punjab SDO will be the Executing Agency (EA) responsible for those aspects. The second stage assessed the impacts that may arise from induced development and for which the EA will not have direct responsibility. In the second case, the SDO will need to liaise with other government agencies to ensure that they are notified of potential impacts and can assist with the development of mitigation and management measures if required. The cumulative impacts are summarized in Tables 2 and 3.

Table 2: Cumulative Impacts from Multiple Small Dams in One Watershed.

Issue	Impact	Mitigation	Responsibility
Increases in the buildup of sediments in sequenced reservoirs	Lack of effective catchment management causes excessive siltation of the dams resulting in shortened operating life. Some dams will be able to remove sediments by flushing.	Community mobilization for effective implementation of catchment management plans	Irrigation and Power Department (IPD) Small Dam Organization (SDO) through routine monitoring of dam flows and sediment levels. Project Management Unit (PMU) and the catchment management specialist to ensure community mobilization.
Erosion in reservoirs and downstream river stretches because of water level fluctuations	Loss of riverbanks due to erosion, excessive siltation of reservoirs. Reduced sediment loading in stream as a result of capture in the reservoirs may result in decreased deposition rates.	Control of inter-dam flows through catchment-wide monitoring of flows. Control of flow velocities. Implementation of bank protection measures for rivers and reservoirs that are especially vulnerable. Subproject selection procedures to ensure that particularly sensitive areas are avoided. A number of small to medium-size dams and reservoirs can help mitigate potential floods, and they can be operated in a way that increases the downstream flow in dry months and decreases the flow in wet months. Increased flow in dry periods will give a more secure supply of water for irrigation, habitats, and other purposes.	PMU and IPD SDO
Creation of microclimates around small reservoirs and changes in regional climate, including precipitation	A beneficial impact resulting in more water resources in a semiarid and degraded environment. The area of water needed to create changes in regional climate is considerable and as the reservoirs are likely to be more than 10 km apart, this is unlikely to be triggered by the project.	None required	N/A
Habitat changes in and around reservoirs, and along the waterways	Increased diversity in habitat types resulting in increased biodiversity within the project area	None required	N/A
Changes in groundwater and surface water interactions	Recharge of some aquifers may be temporarily interrupted due to construction. Aquifer recharge likely to increase resulting from increased head pressure generated by the reservoirs.	Monitoring of wells and bores near dam sites. Provision of alternative supply from reservoir if significant impact occurs	IPD SDO

Issue	Impact	Mitigation	Responsibility
Reduction in fish population, if any, in rivers with sections of reduced flow; however, total fish numbers may increase due to reservoir construction.	Loss of biodiversity from streams and loss of livelihood/food source for any people dependent on fishery for food or income. Such losses are unlikely to occur as streams in the project area do not have fish populations	Replacement of livelihood or food source with fish from the reservoir	IPD SDO
Potential loss, or enhancement, of terrestrial biodiversity and attractiveness of habitats	Inundation of reservoir areas can result in habitat fragmentation and loss of biodiversity.	Implementation of subproject selection procedures to ensure that no subprojects that cause significant impacts to important habitats or vegetation are chosen.	PMU
Changes in hydrological regimes in the watershed, reduced flows causing impacts for downstream users and in-stream ecosystems	The subcatchments within Kot Fateh Khan watershed make up 20% of the entire watershed; The Kanjur and Tajabara reservoirs have capacity for about half of the runoff in their respective catchments; Sadrial reservoir can hold the bulk of the runoff from its catchment and may impact the flow in the Tibba Kas.	Sufficient inflow will remain for Kot Fateh Khan reservoir and will also provide for the mandatory downstream release.	IPD SDO

IPD = Irrigation and Power Department; PMU = Project Management Unit; SDO = small dams organization
Source: Consultant's Report

Table 3: Cumulative Impacts due to Induced Development

Issue	Impact	Mitigation	Responsibility
Reservoir site management and recreation facility development	The reservoirs may lead to the development of leisure facilities such as hotels. Inappropriate disposal of wastewater and waste oils could result in deterioration in water quality	Effective development controls and approvals ensuring conditions of consent include environmental management measures.	Irrigation and Power Department (IPD) Small Dam Organization (SDO) to liaise with town councils and Punjab Environmental Protection Department
Induced residential development	Change from agricultural to residential land use in command area. Generation of wastewater and other waste streams have the potential to pollute the reservoir and waterways.	Effective development controls and approvals ensuring conditions of consent include environmental management measures.	IPD SDO to liaise with town councils and Punjab Environmental Protection Department.
Development of agro-processing industry or other industrial development	Increased agricultural productivity results in the development of new processing industries that require large amounts of water	Effective development controls and approvals ensuring conditions of consent include environmental management measures.	IPD SDO to liaise with town councils and Punjab Environmental Protection Department.

IPD = Irrigation and Power Department; SDO = small dams organization
 Source: Consultant's Report

20. Mitigation measures to minimize potential environmental impacts from multiple small to medium-sized dams include maintenance of environmental flow on a project-by-project basis; integrated watershed management; close coordination between various agencies and upstream and downstream water users; and most importantly, coordinated reservoir operations to ensure minimum maintenance of the required hydrology.

21. Planning and construction, operation and decommissioning of the subprojects will invariably create environmental and social benefits and costs. The magnitude and significance of these potential impacts should be identified during a subproject-specific initial environmental examination (IEE) or environmental impact assessment (EIA), and relevant monitoring and mitigation measures should be elaborated and proposed to avoid, prevent and minimize them accordingly through diligent implementation of the relevant EMP.

22. Potential cumulative impacts due to interactions among development activities in different sectors that may occur on Potohar Plateau may be of the following types:

- (i) watershed development and rural development activities;
- (ii) small dam development and expansion of small towns/residential estates, using the water resource for domestic and industrial purposes; larger towns and residential estates will produce more wastewater and waste that may end in the watershed and in small dam reservoirs;
- (iii) reservoir site management and recreation facility development; and
- (iv) irrigated agriculture development and agro processing or industrial development that need water and produces wastewater.

23. Mitigating measures can only be formulated if the interactions are identified and by cross sectoral coordination and cooperation. This will require capacities for integrated rural and spatial planning with knowledge and procedures for assessing environmental impacts at the level of local and district government bodies. Any capacity building for this purpose is outside the scope of BIWRSP. Nevertheless, the SDO has to remain vigilant of activities in other sectors that may potentially interact with and impact on the functioning of small dam systems, such as the wastewater or waste entering reservoirs, infrastructure and excavation activities that cause erosion and increase sediment yields, etc. Other developments, such as recreational facilities or residential estates that need water sources have the potential for mutual beneficial cooperation with positive environmental and socioeconomic impacts.

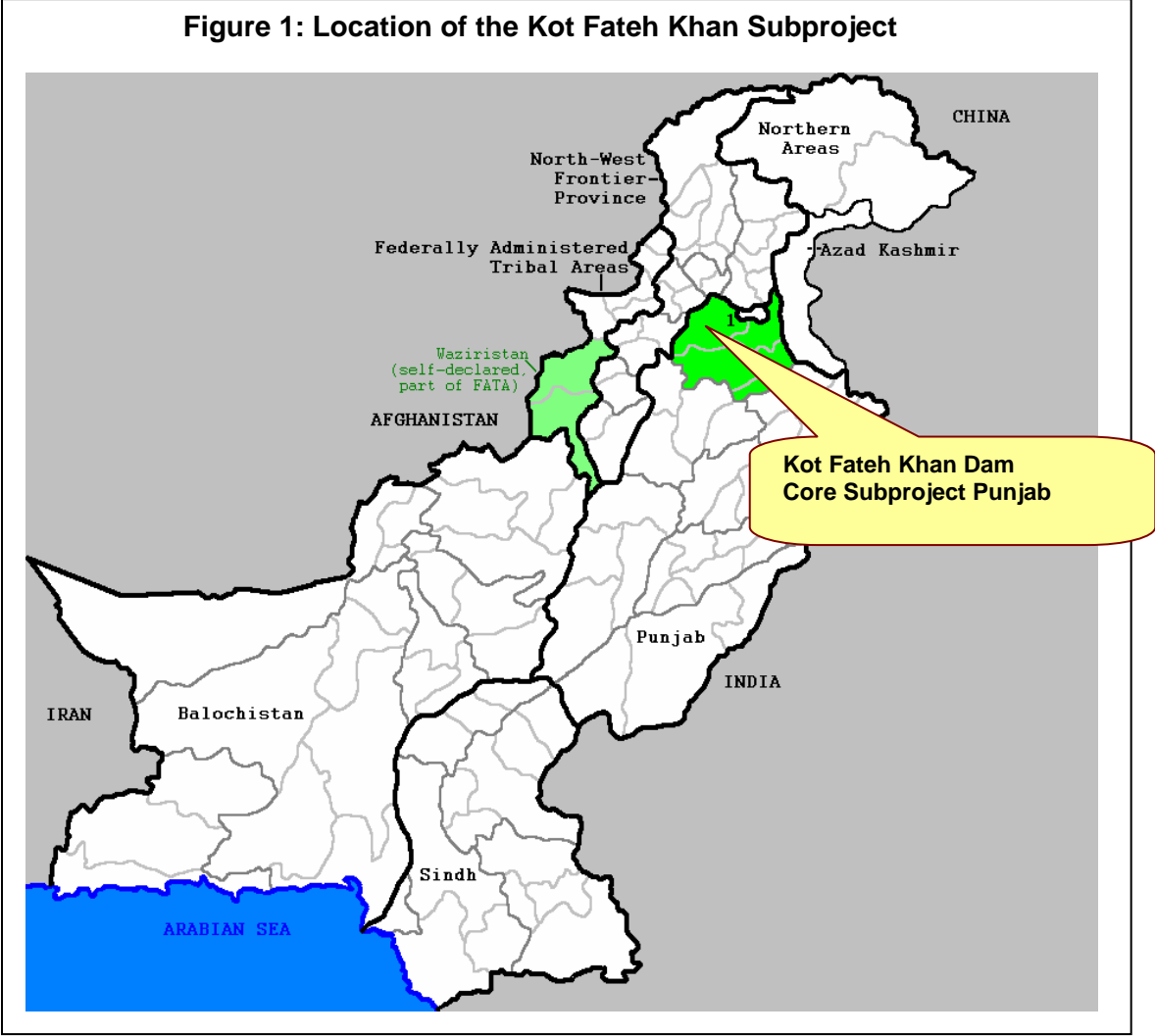
IV. SUMMARY OF SUBPROJECT ENVIRONMENTAL IMPACT ASSESSMENT

A. Description of the Project

24. The Kot Fateh Khan (KFK) subproject includes a medium-sized concrete gravity dam and reservoir on the Dotal Kas stream, the development of irrigated agriculture through a gravity system with lift irrigation to areas above the reservoir; and watershed conservation measures. The proposed KFK subproject is located in Attock district of Punjab Province, approximately 30 km southwest of Fateh Jang town (Figure 1).

25. The selected dam site is located in a narrow valley, which is cut into a flat plateau. It is about 20 m at the valley bottom (elevation 377.00 m above sea level [masl]) and about 115.00 m at the top of the valley cut (412.00 masl). The proposed design is a concrete gravity dam, 38 meters high with a vertical upstream face and an inclined face on the downstream. The dam will be founded at a level 374.00 masl, tying into the bedrock by 3 m.

26. The spillway structure will be placed on top of the dam as an integrated structure. For flood control, a gated ogee spillway with chute and an energy dissipating stilling basin have been included. The spillway is designed to discharge 1,330 cubic meters per second (m³/s), which is a part of the expected total flow of 1 in 1000 years flood which is calculated to be 3,200 m³/s. The remaining flow will be discharged through low level outlets. The low level outlets can also be used as sluices for flushing sediment from the reservoir.



27. The reservoir will be quite narrow and will be approximately 4.6 km long. It will impound an area of 1.7 km² (170 ha) and have a maximum gross capacity of 18.1 million cubic meters (MCM). Approximately 11,000 MCM of water will be provided annually for irrigation of the command area. The size of the command area will be limited to 2,024 ha; if it is any larger, the project will trigger the water-sharing requirements of the Interprovincial Water Sharing Act, 1991. The project will also be developing potable water supplies for local communities around the dam. Water demand for domestic use is a very small percentage of the requirements for irrigation and has been included in the overall irrigation water demand.

28. A concept design for the canal and irrigation system has been prepared. Irrigation water needs to be lifted from the level of the dam up to a distribution tank from where it is initially fed by gravity flow to an area of about 930 ha. This will be developed as command areas for three villages (Makial, Sapial, and Rattarian). The main canal will be divided into two and the remaining irrigation water will be carried along a 13 km branch that will allow the development of another 1,094 ha of irrigated land. Due to the terrain the canals will require siphons to cross some depressions and the irrigated areas will be scattered and located in several villages. A small micro-hydropower plant will be installed to provide power for pumping water up to the distribution tank.

29. The available irrigation water and a focused extension approach will encourage farmers to make a transition to irrigated agriculture. Cropping intensity will increase from 60% to at least 120% and the cropping pattern will include more high-value crops, orchards, and fodder with more use of improved varieties. The extension program will promote appropriate irrigation techniques to minimize soil salinization and integrated pest management to minimize the use of agrochemicals.

30. The total catchment area of the reservoir is 490 km², and contains 40 villages and hamlets and a population of approximately 90,000 persons. Within this watershed is the Kanjur dam, which has a subcatchment of 36.5 km², rendering the net catchment 453.5 km². Watershed management is essential to prevent excessive silting of the reservoir. A watershed conservation plan has been prepared to cover about 150 km² in the area southwest of the watershed, covering about one third of the area. It is foreseen that a conservation area of about 450 ha on the perimeter of the reservoir will be developed to arrest any direct sediment load from that area into the reservoir. The watershed development plan (WDP) includes capacity building, social mobilization, sediment-trapping structures, vegetation measures, and promotion of conservation farming methods.

B. Description of the Environment

1. General Project Setting and Physical Environment

31. The climate of the Potohar Plateau is dry, arid, and subtropical with very hot summers and mild winters. Rainfall is highly variable during the two wet seasons which usually occur from mid-June to mid-September and from December to March. Summer rains provide on average 70% of the annual rainfall in heavy downpours with fast surface runoff. Winter rains fall as gentle showers of long duration and replenish the soil moisture more effectively. The risk of delayed and erratic rainfall in winter makes the future of crops from rainfed lands very uncertain. Summer temperatures in June and July may go as high as 40 °C; in winter, temperatures drop to as low as 1 °C.

32. The Potohar Plateau typically consists of dry, sparsely vegetated plains intersected by streams and rivers that cut valleys and gorges into the sandstones, siltstones, and shales. Low rainfall, the clearing of vegetation for fuelwood, and the development of agricultural land contribute to the parched nature of the landscape.

2. River System, Hydrology, and Water Quality

33. The dam will be sited on a stream called the Dotal Kas. Feeding into the Dotal Kas are the Tibba Kas, Shiniwal Kas, Khuyanwala Kas, and Kanjur Kas tributaries. The Dotal Kas drains

into the Sil River and ultimately into the Indus River. The computed mean daily flow at the dam site is 2.16 m³/s, while the mean annual inflow is 68.28 MCM.

34. Water samples from seven drinking water sources at villages around Kot Fateh Khan dam site were collected and analyzed. Most of the parameters tested were within the permissible limits; however, results for conductivity, hardness, and alkalinity were toward the upper limits for drinking water and a few samples had elevated levels of sodium and chloride. In the majority of cases, the source of the water was groundwater from wells. Results of the analyses show that in some wells, parameters were above WHO guidelines for drinking water quality. Elevated levels of chloride, sodium, conductivity, hardness, and alkalinity were recorded.

35. Kanjur dam, built in 1978 is a small dam reservoir storing water from a 36.5 km² sub-watershed. The dam provides irrigation water to Lund and Dhulian and supplies drinking water to the villages Dhulian, Dhok Makki and Dhok Nauthenwali. The SDO plans two more small dam reservoirs within the watershed: one south of Kanjur reservoir on Tibba Kas between Sadrial and Bakhuwala, and another one near to Tajabara in the eastern part of the watershed

3. Ecological Environment

36. The natural vegetative cover of the area is characteristic of a semiarid subtropical eco-zone. Little natural habitat remains, having been altered by various anthropogenic activities and influences.

37. The scattered trees and bushes of the predominantly rocky slopes of the river are made up of a number of mainly xerophytic (i.e., drought-tolerant), medium-sized to small thorny species like Pulai (*Acacia modesta*), Zizyphus, Peelu, and *Olea ferruginea*. Typical grass species are Suriala (*Herteropogon contortus*) and Khabbal (*Cynodon dactylon*). The rangeland is grazed by sheep, goats, and cattle. Grazing has a significant impact on the degree of vegetative cover and species composition. There are no records of rare, endangered, or protected plant species in the project area.

38. Terrestrial fauna in the project area is relatively diverse, and includes hares, wild boars, mongooses, and porcupines as well as some reptile species and various arthropods. There are numerous reports of wild boar damaging crops. The rocky areas and rangelands provide both feeding and breeding habitat for several bird species. Hunting of partridges is an appreciated leisure activity. People in the watershed reported that hunters adhere well to the permitted season and to the rotation system that allows populations to rest/recover for one or two seasons.

39. There is no record of any species of fauna in the project site and area of influence that is endangered, rare, or protected under the laws of Pakistan and applicable international environmental agreements, as well as of any species that are listed in a draft Red Book of Pakistan and the International Union for the Conservation of Nature (IUCN) registers.

4. Socioeconomic Conditions

40. The population of the villages in the watershed is estimated to be about 92,800 persons, with nearly one third living in or near Fateh Jang. In total there are over 40 villages and hamlets in the watershed. In the six command area villages, the total population for 2005 was estimated at 8,820: 5,250 for the three villages for gravity irrigation (Makial, Sapila, and Rattarian) and

about 3,570 for the three villages for lift irrigation (Sohal, Thatti Nur Ahmed Sha, and Bakhwal); the latter are located in the watershed.

41. Agriculture is the main source of income and of food supply. Agriculture is mainly rain-fed cropping of wheat, mustard, sorghum, millet, maize, and peanuts. Fertilizer and agrochemicals are hardly used. Livestock (cattle, buffaloes, goats, sheep, donkeys and some horses and camels) are fed on crop residues and fodder on the farm premises. Chickens are kept for eggs and meat. Goats and sheep, and sometimes cattle, graze fallow land and barren land/rangeland. Wage labor in nearby towns, and migration to large cities and the Gulf states are a major source of household income as well.

42. Land tenure varies from large landowners to smallholders, lease farmers, tenants, and landless households. No communal land was reported. A small farm machinery plant exists in Kamra village inside the watershed and there are several workshops in Fateh Jang.

C. Consideration of Alternatives

43. Without the KFK subproject, the existing situation of low-productivity agriculture combined with a high risk of crop failure will continue, and the opportunity to overcome the water constraint by trapping the runoff water will not be used. Building the dam and using the reservoir for irrigation will increase crop yields, allow the growing of higher value crops, and reduce crop failures. The without-project alternative would not be in line with the economic development policies of Pakistan, and ADB and would forgo the potential to use water resource to reduce poverty.

44. A number of project design alternatives were considered by the TA technical teams. They included (i) siting, type, and height of the proposed dam; (ii) design and location of spillway structures; (iii) design and location of outlets and diversion channels; (iv) design and location of water intake and release structures; (v) irrigation channel and pipeline versus use of existing river and pipeline, and creating a small pond downstream, to deliver water to selected command areas; (vi) design and location of the micro hydropower plant to provide electricity to service two proposed pumps to uplift water to the distribution tank; and (vii) operational alternatives of the proposed reservoir for supplying water for irrigation and meeting the potential demand of the increasing local population.

D. Impacts During Construction

45. **Workers Camp.** A small construction camp will be required by the contractor for accommodating the workers; storing equipment, materials, and fuels; and servicing vehicles. The camp will be located close to the construction site, most likely on the right bank of Dotal Kas. It will be about 3 km away from Sohal village and 2.5 km away from Dhok Mian Ahmad village. Activities at the camp need to be conducted in a manner that ensures no disturbance or pollution.

46. **Air Quality, Noise, and Vibration.** Vehicle movement, excavations, possible blasting, stone crushing at the construction site, as well as transport of the building materials, will produce noise, dust and vibration. Excavations and backfill will be about 10,000 m³; excavations of rock about 35,000 m³; and foundation treatment will have a volume of 8,000 m³. Gravels and coarse aggregate for about 15,000 m³ concrete have to be brought from Haro/Indus river and from Margala Hills and will include about 1,000 to 1,500 truckloads with additional transport for other construction materials (cement, shuttering materials, reinforcement, gates, etc.). The

construction site is well away from villages and in a gorge. The haulage road will most likely pass between Sohal and Dhok Mian Ahmad and must keep sufficient distance (e.g. 400 m midway from Sohal and Dhok Mian Ahmad) to minimize dust and noise disturbances. Alignment is to be agreed upon with the concerned communities, the road should be marked with signs, and the communities should be informed about risks to minimize accidents. Other measures to minimize adverse impacts are to restrict vehicle movements to daytime, impose speed limits, put up signboards or speed bumps. Dust will be controlled by spraying water in dry periods.

47. **Waste Construction Material.** Waste construction material can be recycled for backfill, but surplus material (likely to be more than 30,000 m³) will need to be disposed of in such a manner that it will not block streams, cause extra sediment loads or other negative impacts. Excavated rock can be recycled if an alternative use can be found; otherwise, it will be disposed of in an approved disposal site. Other waste materials (e.g., packing materials) will be stored and disposed of in an appropriate site and will not be allowed to litter the landscape or the stream.

48. **Hydrology and Water Quality.** During construction, stream flow will be diverted, but since the stream is within the narrow gorge, no significant changes in flow or downstream impacts are anticipated. No negative impacts on water quality due to construction activities are anticipated provided an effective environmental management plan that will include suitable sediment control methods is implemented.

49. **Impoundment Area.** There is very little biomass in the impoundment area except for a few trees and grasses. The trees will be removed before filling for use as fuelwood. Grass is also limited. It is anticipated that the small amount of remaining biomass in the reservoir poses no risk to the water quality.

50. **Command Area Development and Irrigated Agriculture Development.** This will include the construction of secondary and tertiary distribution canals and field leveling. The activities will include dispersed construction and earth moving works, which will be conducted in a manner that ensures minimal erosion and generation of dust and sediments.

51. **Ecological Impacts.** The project area has no protected species of flora and fauna; biodiversity and natural habitats of a semiarid zone are not diverse and large areas of the watershed have already been disturbed by erosion and overgrazing. No negative impacts are anticipated.

E. Impacts During Operation

52. Once construction is complete, the project will provide significant environmental and social benefits to the project area. The creation of a new and large water body in a semiarid environment and the associated watershed management measures will increase habitat diversity, which is likely to lead to increased diversity of flora and fauna species in the project area. There are two potentially significant negative impacts during the operational phase: sediment buildup in the reservoir leading to greatly reduced water storage, and potential downstream impacts resulting from reduced flows.

53. **Hydrology and Sedimentation.** Due to soil erosion and runoff in the watershed, about 0.5 MCM sediment will enter the reservoir every year. Watershed conservation and sustainable watershed management are expected to reduce sediment yield by about 20%. The dam design includes flushing gates and due to the narrow and long shape of the reservoir it is expected that

about 75% of sediments can be flushed from it. Without these measures the dead storage of the reservoir (6.5 MCM) would fill up in 13–20 years, but with their implementation the reservoir's economic life will be prolonged beyond 50 years. Flushing will only take place during periods of high flow in the stream, and so the high sediment loadings downstream of the dam would reflect naturally occurring levels found during periods of heavy rain.

54. The reservoir will trap sediments during normal operation and thus overflow and released water will hold less sediment and be of cleaner quality. An environmental flow will be a requirement of the operational guidelines of the dam, and 500 liters per second (l/sec) will be maintained. However, most of the time this rate of flow will be exceeded, and so, any impacts on downstream water users and the ecology of the stream are considered unlikely.

55. In the initial years recharge of aquifers might be affected by the dam and the grouted curtain, but because of the environmental flow overflows, the recharge is unlikely to be affected. In the longer run, saturation of the subsoils from reservoir pressure is anticipated to result in seepage and in better recharge of aquifers and greener vegetation growth around the reservoir.

56. Reservoir water will also be used to supply water to the surrounding villages. The existing water supply in nearby villages is of poor quality and sometimes is insufficient. A supply of treated water from the reservoir will result in reliable and better quality water.

57. **Command Area and Irrigated Agriculture Development.** After completing the tertiary distribution infrastructure and field preparation (leveling), fields can be irrigated and the project will provide extension services to farmers to make a transition to irrigated agriculture with traditional, high-value, and orchard crops. High-value (horticulture) crops use external inputs such as agrochemicals and fertilizer, which may present health risks to farmers and residues may end up in the environment. Improper irrigation and drainage may result in salinization of soils and reduction in production. These risks are foreseen, and the extension and training packages for farmers include proper irrigation and drainage management, production technology, and safe use of agrochemicals and fertilizer and will minimize any possible adverse impacts.

F. Environmental Management and Monitoring Plan

58. The EMP for the subproject describes detailed remedial and safeguard measures for all potential impacts identified during the assessment studies. The EMP aims to ensure that adverse impacts associated with the project are addressed at all stages, either by preventing them or by mitigating them to an acceptable level by adopting the most suitable technical and economic option. All efforts will be made to ensure that local values and cultural and religious sensitivities are respected. The environmental management and monitoring plan will strictly adhere to national laws and environmental standards and regulations. All remedial environmental management measures are detailed in tabular matrixes in Appendix I.

G. Public Involvement and Disclosure

59. In November 2006 formal public consultation meetings were held by the PSA team and environmental consultants in KFK subproject area villages (Makial, Rattarian, Sapial, Sohal, Thatti Nur Ahmad Shah). The purpose of these meetings was to introduce the project and to inform the villagers about the scope of the study and planned activities and consultations to be held during the project preparatory technical assistance. In mid-December 2006, as part of EA preparation, systematic consultations with officials from provincial and district departments as

well as representatives of nongovernment organizations started. In February–March 2007 further consultation was held in Sohal, Thatti Nur Ahmad Shah, Bakhuwala, and Lund to discuss land acquisition and compensation measures. Discussions identified project-relevant environmental issues and previous experience with the construction and operation of other small dams in the region. In February–March 2007, 15 villages in the watershed were visited to inform the villagers about the project and to investigate the status of erosion and the potential for effective watershed development.

60. Community concerns and observations that were expressed in the command area villages are shown in Table 4. In the watershed the problems were similar, but in addition lack of veterinary services was frequently mentioned.

Table 4: Problems Reported by Communities in Project Villages

Problem
• Water scarcity for cultivation and drinking / household use
• Agricultural land development
• Poverty and unemployment
• Scarcity of cooking fuel
• Unsanitary conditions of the village
• Lack of health care facilities
• Inadequate schools
• Inadequate road connection with surrounding towns and villages especially during rainy season

Source: PPTA CWSIADP TA No. 4802-PAK.

61. The community consultations demonstrated widespread support for the project; and approval for project activities by the communities was evident. The consultation was considered as a positive gesture and appreciated. According to the communities, project activities in the area are expected to improve their well-being by providing irrigation water and corresponding employment opportunities, as well as better drinking water. The villagers also emphasized that they should be informed well in advance of the start of project activities in an area and that village elders should be involved in marking the sites for reservoir and irrigation canals. Communities in the project area also emphasized that local villagers should be given priority when employing people for various project-related works and activities. The minutes of the various consultation meetings are presented in Appendix 2.

62. Community consultation will continue to be central in the development of new subprojects under the BIWRSP, with the initiation of new schemes requiring consultation to determine demand for the subprojects. Without a demand from the communities the subprojects will not proceed. Farmers and villagers will be organized into community-based organizations and farmer organizations. They will be responsible for O&M of the irrigation distribution systems and also for implementing watershed management activities. In this manner the affected communities will be actively involved in the planning and implementing the subprojects.

V. ENVIRONMENTAL CRITERIA FOR SUBPROJECT SELECTION

63. To implement environmental considerations across all subprojects the following

environmental criteria have been proposed.

- (i) All subprojects will avoid areas with defined or known environmental sensitivities.
- (ii) Subprojects requiring environmental assessment must follow the procedures detailed in the environmental assessment and review procedures.
- (iii) Subprojects will avoid apparent pollution sources to minimize the risk of water contamination and ensure safety of the water supply.
- (iv) Subprojects will be selected to maximize environmental benefits and minimize adverse environmental impacts to the extent possible.

64. Water is an extremely valuable commodity in rain-fed areas and therefore the existing water user rights must be recorded and potential impacts assessed. The assessment is required to undertake a detailed review of the requirements of existing downstream users as well as considering the ecological water demand based on the environmental values of the streams or rivers affected by each sub-project. For subprojects sited on streams or rivers with permanent flows, an environmental flow must be maintained; the minimum allowable will be 10% of existing flows. The selection of an environmental flow regime will need to be justified through using an appropriate environmental flow methodology such as the Tennant methodology and must take account of the ecological and geo-morphological values of the water course. The compensatory flows calculated for each subproject must therefore be based on the existing social and environmental demands rather than on what supply is available after project demands are met. Water is an extremely valuable commodity in rain-fed areas and therefore the existing water user rights must be recorded and potential impacts assessed. Necessary mitigation measures will be considered to minimize downstream impacts due to reductions in environmental flows caused by subprojects.

65. Besides site screening and initial site investigation, one of the effective measures to meet the environmental criteria is to identify and conduct an analysis of alternatives. Where possible and appropriate, subprojects, multiple/alternative sites, designs, and/or scales will be identified and evaluated during subproject identification and evaluation to allow the selection of optimal or least-impacts alternatives. Staff of the project monitoring office, assisted by qualified environmental specialists and environmental institutions, will work closely with the project planners and engineers throughout the project identification and preparation stages. They will provide the necessary input to ensure that environmental considerations are included in the decision-making process.

VI. ENVIRONMENTAL ASSESSMENT AND REVIEW PROCEDURES

A. Environmental Assessment Requirement

66. The Pakistan Environmental Protection Act, 1997 and corresponding Pakistan Environmental Protection Agency (EPA) Review for IEE and EIA Regulations (2000) prescribe the environmental assessment requirements and procedures applicable in Pakistan. The act requires proponents of all development projects to prepare and submit environmental assessment reports for review and approval by competent authority. It also sets out the different levels of assessment that are required and details the requirements for IEEs and EIAs. In the case of this project, the competent authority will be the Punjab EPA.

67. In June 2000, the Government of Pakistan issued the "Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations". Schedules I and II of the regulations define the type of development

projects requiring appraisal and the level of assessment required, either an EIA or IEE. Schedule II provides a list of projects that have potential to affect a large number of people. The impacts of these projects may be irreversible and could lead to significant changes in land use and in the social, physical, and biological environment. For dams and irrigation projects Schedule II determines that an EIA is required for dams and reservoirs with a maximum storage volume greater than 50 million m³ or surface area greater than 8 km² or irrigation serving more than 15,000 ha.

68. Schedule I defines projects that require an IEE. It deals with projects where the range of environmental issues is comparatively narrow and issues can be understood and managed through less extensive analysis. Under the laws of Pakistan, an IEE is required for dams and reservoirs with a maximum storage volume of less than 50 million m³ or surface area less than 8 km² or small-scale irrigation systems.

69. ADB has assigned environmental category A to reservoir projects which involve the construction of a dam higher than 15 m or reservoir capacity greater than 3 million m³. This approach to categorization adopts a set of criteria developed for technical design and dam safety requirements and also indirectly takes account of environmental issues by assuming a positive correlation between dam height, reservoir size and environmental impacts. The EARP for this project has been developed to provide a new approach for environmental categorization of dam projects; this is achieved through (i) a procedure that focuses on the direct physical, environmental and social effects of each subproject rather than on indirect proxies, and (ii) ensures alignment between the Government of Pakistan and ADB procedure.

70. A detailed site assessment will be required early in the site selection process, which will provide an evaluation of the potential environmental and social issues associated with the specific subproject area. This will function as an environmental screening mechanism early in the site selection process, and if the area is suitable for the development of a small dam it will also ensure that the level of environmental assessment selected is appropriate, taking into account local conditions and constraints. However, the application of a set of triggers and thresholds developed for a world wide classification has a significant weakness in that it does not take account of the physical, environmental and social characteristics of a particular project and its surrounding environment. The Environmental Assessment and Review Procedures (EARP) for this project have been developed to provide a much more focused, site-based approach for each subproject. A detailed site assessment will be required early in the site selection process which will provide an evaluation of the potential environmental and social issues associated with the specific subproject area. This will function as an environmental screening mechanism early in the site selection process, and if the area is suitable for the development of a small dam it will also ensure that the level of environmental assessment selected is appropriate taking into account local conditions and constraints.

B. Environmental Categorization Procedures

71. A four-stage procedure has been developed for the environmental categorization of subprojects. In summary the four stages are as follows:

- (i) stage 1: desk top review of existing information,
- (ii) stage 2: site investigation and assessment,
- (iii) stage 3: initial environmental screening and categorization, and
- (iv) stage 4: ADB Review and CCO's sign-off.

72. The completion of the procedure for environmental categorization will ensure that there is a focused, site based assessment of the environmental and social conditions of the study area. The procedure will ensure that the appropriate level of assessment is assigned to each subproject. For those projects with the potential to have a significant adverse impact on the environment, or those that trigger Schedule II requirements of the Government of Pakistan regulations, an EIA will be required. For projects with a lower level of environmental impacts and which do not trigger Schedule II requirements, an IEE will be prepared.

C. Responsibilities

73. A Social and Environmental Monitoring Unit (SEMU) has been established by the Punjab Irrigation and Power Department (IPD) under PIDA and has the responsibility for environmental preparation, clearance supervision, monitoring, enforcement of mitigation measures and review of environmental performance during subproject implementation. This standard operating procedure extends to all IPD projects and no project can receive a PC 1 clearance unless environmental and social checklists have been prepared and approved by the SEMU. The SEMU will therefore have an important role in the project. In particular the SEMU will have the following responsibilities during project implementation.

- (i) Provide inputs on environmental and social considerations in subproject identification and implementation.
- (ii) Confirm subproject environmental categorization, and corresponding environmental documentation requirements, and review and clearance procedures, in consultation with the ADB task team and local environmental authorities, and in accordance with the relevant ADB guidelines and domestic regulatory requirements.
- (iii) Request, as may be appropriate, the engagement of professional consultants in the preparation of EIA documents to comply with the relevant regulatory requirements and ADB safeguard policies.
- (iv) Review completed environmental assessment documents for the subprojects. As the regulatory review and approval will be the responsibility of the Punjab EPA, the review by the SEMU will be to ensure the documents meet ADB requirements. Once satisfied, the SEMU will make recommendations on clearance to the ADB project task team.
- (v) Supervise the implementation of environmental mitigation during the project construction and operation stages, through site visits, inspection tours, receiving and responding to public concerns and complaints; and review reports from contractors and project implementation units.
- (vi) Request engagement of environmental monitoring consultants to carry out the environmental monitoring programs outlined in the subproject EMPs. The SEMU will also be responsible for reviewing the monitoring reports and responding to any recommendations made in the monitoring reports.
- (vii) Initiate corrective actions and additional mitigation measures to those proposed in the EMP as may be needed during project construction and operation phases, in response to site supervision, monitoring and/or public complaints.
- (viii) Communicate and coordinate among project stakeholders, the EA, PIUs, other relevant government agencies, professional teams/consultants, contractors, construction supervision companies, project communities, the general public as well as ADB, on environmental matters and advise senior management on changes required to policies, actions and programs to ensure the impacts of the

project are minimized and project activities remain in full compliance with regulatory standards, and ADB safeguard policies.

- (ix) Organize and coordinate project completion environmental acceptance inspections and review, in accordance with relevant domestic regulatory requirements.
- (x) Conduct other tasks as may be requested by the PMU, or as may be recommended by ADB or as may be needed by the project for environmental protection.

D. Public Disclosure

74. The Punjab IPD and ADB agree that in disclosing the environmental document to the public, (i) IPD is responsible for ensuring that all environmental assessment documentation, including the environmental due diligence and monitoring reports, are properly and systematically kept as part of an IPD project-specific record; (ii) all environmental documents are subject to public disclosure, and therefore should be made available to the public, if requested; and (iii) for category A subprojects (Schedule II under Government of Pakistan regulations) , the summary EIA (SEIA) needs to be disclosed to the public through IPD and ADB's websites 120 days before civil works start. The SEIA has to be reviewed by ADB before it is disclosed to the public. Quarterly environmental monitoring reports will be prepared and sent to ADB. ADB will post the reports on its website.

E. Staffing Requirements and Budget

75. Punjab IPD's SEMU will be the organization with responsibility for overseeing the implementation of the environmental safeguards required for the project. The SEMU is less than a year old but already has significant staff resources. It is headed by a director with four deputy directors and support staff. Its responsibilities include providing environmental inputs for subproject identification, project categorization and EA implementation/contracting, review and recommendation for clearance. There is a requirement that the SEMU be provided with technical assistance to allow it to develop the skills and experience necessary to undertake the procedures to the required standard. Technical assistance will be provided by an international expert with experience in environmental assessment and management. The international expert will spend 5 person-months with the project and a budget of \$87,400 has been provided for this.

76. At this stage of project development, the number of subprojects that will be completed is not known and so it is not possible to determine overall costs for implementing mitigation measures and environmental management. However, costs for a typical subproject have been developed and are presented in Table 5. Bills of quantities for mitigation measures developed during the construction phase will be included in the tender and contract documents where appropriate. Contactors will bear the costs for mitigation measures during the construction phase. The costs for implementing the EMPs for the subprojects will also be the responsibility of the contractor. The SEMU will monitor and evaluate the implementation of the EMPs. The cost of project supervision will be part of the SEMU's normal overhead.

Table 5: Environmental Management and Monitoring Budget for a Typical Subproject

Activity	Budget (\$)
Environmental screening and categorization	5,000
Environmental assessment and EMP preparation	52,555
Cost of mitigation measures	Contractors cost
Watershed management activities – new dams	459,000
Watershed management activities – existing dams	124,450
Environmental monitoring (SEMU)	127,122
Total	768,127

EMP = Environmental Monitoring Plan; SEMU = Social and Environmental Monitoring Unit
Source: Consultant's Report.

77. An indicative budget has been prepared for environmental monitoring requirements for a single project. A breakdown of the budget can be found in Appendix 1. As the number and location of subprojects is not yet known, it is not possible to provide a more detailed overall figure.

VII. CONCLUSION

78. The project categorized as Category A sector loan under ADB *Environmental Assessment Guidelines* and a Sector Loan EIA has been prepared along with an EIA for the sample subproject at Kot Fateh Khan. The findings of the environmental assessment studies show that the Project will provide significant environmental benefits resulting from the presence of permanent water bodies in an otherwise dry environment. The watershed management measured will increase vegetation cover and conserve soils, improving the diversity of habitats and landscape. Any negative impacts are expected to be temporary, mainly associated with construction work, and will be mitigated through the effective implementation of Project environmental management plans. The presence of a large body of water will alter the landscape and flood the existing river and gullies, however, these impacts are offset by the considerable benefits of the development of irrigated agriculture. Mitigation, management and enhancement measures have been proposed to minimize impacts and ensure the benefits are captured. If the prescribed mitigation and management measures are fully implemented the sub-projects are unlikely to have any adverse environmental impacts. An environmental monitoring plan has been prepared and responsibilities for implementation assigned. A budget has been allocated for environmental management and monitoring.

79. The potential environmental impacts generated by the subprojects are expected to be manageable. However, EMP implementation needs to be monitored continuously, and the newly formed SEMU have the responsibility to ensure this occurs.

80. The environmental assessment and review framework have been formulated to ensure that the project will be implemented in accordance with ADB's and the Government's environmental policies.

ENVIRONMENTAL MANAGEMENT PLAN FOR KOT FATEH KHAN SUBPROJECT

Table A1.1: Kot Fateh Khan Proposed Environmental Management Plan

Location, Extent, and Anticipated Impacts and Magnitude	Significance	Proposed Mitigation	Responsibility	Monitoring Parameters and Possible Remedial Actions	Monitoring Responsibility
Preparation Phase					
Loss of assets and resources	Significant for individual owners, permanent	Compensation to affected persons as described in LARP. Vegetation measures (part of WDP) in the protection zone will compensate part of the lost trees.	SDO with local tax authority	Verify if LARP is completed prior to the start of the construction work; if not completed, construction must be delayed. Check if complaints are adequately addressed and solved.	SDO/ PMU
Construction Phase					
Construction site: dust, noise, blasting, high-elevation work posing risk to workers' health and safety at the construction site Disposal of waste construction materials	Significant, temporary	Safety measures on the site with fences, signboards, etc. instructions to workers, and an emergency first aid post, preparedness for emergencies. Waste materials have to be disposed of safely. Sprinkle water during dry dusty conditions. Vehicles and equipment are to be kept in good running condition and properly tuned and serviced to minimize exhaust and leakages. Workers are insured against accidents. Ensure that provisions are included in the construction contract.	Obligations to be included in the construction contract	Check if safety precautions for construction site and work camp (fences, signs, first aid, instructions) are part of the service contract (prior to signing), including penalty clauses in case of non-adherence; if not adequate, the contract has to be revised. Respond to possible complaints of communities. Inspect adherence to these conditions during work progress inspections; in case of non-adherence, impose fines or stop work (depending on nature of offence)	SDO/ PMU
Work camp: storage of fuels and disposal of waste lubricants Disposal of waste from workers camp, hygiene and sanitation risks Possible fuel collection and hunting by workers Influx of working people from outside	Significant, temporary	No objection/agreement of owner of the site for use. Safe storage devices and sites, compulsory safe disposal of wastes; precautions to avoid contamination of soil and water due to filling and servicing of vehicles and equipment. Contractor must ensure safe drinking water, sanitation and waste disposal; basic first aid/ health service, awareness	Obligations to be included in the construction contract	During construction adherence to the precaution, sanitation and safety provisions is verified. In case of non-adherence penalties can be imposed or works have to be stopped, according to the severity and nature of the offence. Ensure that camp site is properly rehabilitated after it is vacated. In case of a violation, a sum should be retained from final payment, to be used for rehabilitation.	Supervision Engineers, SDO/PMU

Location, Extent, and Anticipated Impacts and Magnitude	Significance	Proposed Mitigation	Responsibility	Monitoring Parameters and Possible Remedial Actions	Monitoring Responsibility
		information for protection against HIV/hepatitis. Restrict fuel collection and hunting and provide alternative cooking fuels. Engagement of local labor should be preferred. Rehabilitate the camp site after vacating it, by creating a landscape and establishing vegetative cover. Ensure that provisions are included in the construction contract.			
Access road may lead to noise, dust; and accidents may lead to heavy traffic	Moderate, temporary	The access road should bypass villages and keep sufficient distance (agree on alignment with concerned communities; impose speed limits, set up clear signboards and speed bumps, and avoid traffic at night).	SDO and contractor have to identify a suitable alignment	Measure/assess noise levels prior to construction; in case of complaints from villagers, verify level of noise, dust, adherence to speed limits, and take corrective measures if required.	Supervision engineers, SDO/PMU
Construction activities along distribution canals and network and field leveling will cover a total of 2,024 ha and a 13 km main canal.	Moderate to insignificant, temporary	Similar precautionary measures have to be taken as at the dam construction site, safe waste collection and disposal, worker safety measures.	Contractor(s), farmers	Verify if precautionary obligations are part of the contract(s) prior to signing; verify adherence during the works; in case of non-adherence impose fine/stop works.	Supervision engineers, SDO/PMU
Command area development will cover about 2,024 ha with activities such as field leveling, tertiary canals, and introduction of new cropping systems (that will be effective in the operation phase).	Moderate	Ensure that erosion risk in leveled fields will be minimized, e.g., leveling and bunds; due to farmers' interest they will benefit most and will be motivated to do so.	Farmers and farmer organizations	Survey for possible erosion risk in developed command area; in case of erosion risk or inadequate drainage provisions, extra efforts should be made to persuade farmers to remedy the situation.	SDO/PMU
Operation Phase					
Hydrology: stream flow may cease completely during filling stage. Total annual flow is on average 68.3 MCM; the storage capacity of the reservoir is 18.1 MCM and thus is expected to fill in one rainy season (average expected inflow in July and August is already 38.86 MCM)	Likely insignificant, temporary	Mandatory flow of mandatory minimum release of 500 l/sec (15.8 MCM, or 23% of the annual inflow) during filling and operation will fully mitigate this potential impact	SDO	Monitor if the mandatory flow is maintained. Monitoring is a reservoir operation obligation and for environmental monitoring only the records need to be verified. In case mandatory flow is not maintained without valid reason (prolonged drought), the reservoir operator is to be disciplined.	SDO as reservoir operator

Location, Extent, and Anticipated Impacts and Magnitude	Significance	Proposed Mitigation	Responsibility	Monitoring Parameters and Possible Remedial Actions	Monitoring Responsibility
Downstream aquifers may receive less replenishment initially, but afterwards seepage is expected to result in increased replenishment of aquifers.	Possible small initial impact of a temporary nature; afterwards positive	Monitor downstream aquifers, e.g., wells; mandatory flow will likely mitigate the possible temporary small impacts	SDO	Measure levels and yields of downstream wells prior to dam construction and annually after reservoir filling for 3 years Also collect opinion of well users	SDO
Water quality may not be suitable for drinking water, but generally better than that of existing sources.	Moderate, permanent	Treatment of water for the village is included.	SDO, Public Health (PH)	Verify if water treatment according to PH specifications is implemented after operation. Note that water quality in the reservoir will likely also be monitored by the Fisheries Department if it stocks the reservoir. SDO can make use of that data for its own benefit.	PH, communities
Presence of water body and canals may increase incidence of waterborne diseases.	Moderate, temporary	Sanitation and health information to people in command area and near the reservoir as part of watershed and CCA development; water treatment for village water supply schemes is foreseen	SDO, PH, and partners implementing watershed development and irrigated agricultural development	Verify if information campaign is implemented and if people take measures for preventing diseases as recommended. Carry out an annual survey in command area villages and villages near the reservoir. In case of health problems, communities and PH should be activated to resolve the issue.	SDO/PMU, but later on responsibility of PH
Sedimentation of reservoir due to soil erosion and runoff in the watershed; sediment entering the reservoir is estimated to be around 0.514 MCM/annum on average.	Significant	Watershed conservation and sustainable watershed management will reduce sediment entering; deposited sediments can be flushed and gates are foreseen in the dam design	Watershed communities and SDO	Verify if the WDP is implemented and if communities have formulated medium-term watershed management plans. SDO should monitor water inflow and sediment load as part of normal reservoir operations.	SDO
New landscape and reservoir offer opportunities for recreation sites and employment potential for recreation services; recreation may lead to littering.	Recreation is considered positive; littering will be minimal.	Environment-friendly layout of recreation site and fitting into the landscape; proper site management, waste receptacles, signs	SDO, participating communities	Verify if environmental aspects are included in the design and layout of recreation facilities. The clean use of such a site should be of interest to SDO that, as reservoir operator should act in case of improper use of the site.	SDO
Irrigated agriculture development (2,024 ha) with more external inputs carries risk of siltation (improper irrigation & drainage). Wrong use of agrochemicals and fertilizer may be unsafe for	Moderate	Extension and training of farmers on proper irrigation and drainage, production technology and safe use of agrochemicals and fertilizer	Extension service (of project/government)	Verify if IPM and safe use of agrochemicals and fertilizer are part of the training and promotion program. As follow-up, check by survey if farmers gained knowledge, use the substances and, if so, do so safely; if	SDO/PMU

Location, Extent, and Anticipated Impacts and Magnitude	Significance	Proposed Mitigation	Responsibility	Monitoring Parameters and Possible Remedial Actions	Monitoring Responsibility
farmers and residues may end up in the environment				application is not done properly, a special campaign should be undertaken to convince farmers of the benefits of correct and safe use.	
Gender provisions are included in watershed development and in irrigated agricultural development to allow women to participate in planning and implementation.	Positive	Implement the gender provisions in the action plans for watershed development and irrigated agriculture.	SDO	Monitor if women have participated in watershed development activities and in irrigated agriculture development (e.g., participation in meetings, training) and afterwards participated in watershed management and irrigated agriculture (have a separate survey 1 year after dam is in operation); in case of poor participation, determine the causes and have the social field teams exert more efforts.	SDO/PMU

CCA = cultivable command area; HIV = human immunodeficiency virus; IPM = Integrated Pest Management; LARP = Land Acquisition and Resettlement Framework; PH = Public Health; PMU = Project Management Unit; SDO = small dams organization; WDP = Watershed Development Plan

ha = hectare; km = kilometer; MCM = million cubic meters

Source: Consultant's Report.

Table A1.2: BIWRSP Environmental Monitoring Plan for Subproject

Environmental Component	Project Stages	Parameters	Locations	Frequency	Standards	Approximate cost (PRs)	Implementation	Supervision
Air quality	Construction	Visible dust	At sensitive receptors close to haul routes or construction sites	Daily	EPA ambient air quality standards	Contractor's cost	Contractor's supervision of EMP requirements	Safeguards unit/SEM U
	Operation							
Noise	Construction	dB(A)	At sensitive receptors close to construction sites or haul routes	24 hours continuous monitoring at selected sites. Quarterly for identified sites; as required for complaints received	EPA Ambient Noise standards.	PRs2,000 per monitoring event (8 sites, 4x/yr) = PRs64,000 Contractor's cost	Contractor	Safeguards Unit/SEM U
	Operation							
Water quality	Construction	pH, conductivity, total dissolved solids, total suspended solids, coliforms, visible oil and grease	2 locations upstream of the construction site, 4 locations downstream	Monthly	WHO and NEQs	PRs15,000 per sample 6 sites, 12 events for 3 yr = PRs1,080,000/yr	Contractor to undertake monitoring. SEM U To monitor performance	Safeguards Unit/SEM U
	Operation	pH, conductivity, total dissolved solids, Total hardness as CaCO ₃ , Ca ⁺⁺ Mg ⁺⁺ Total alkalinity as CaCO ₃ bicarbonate (CaCO ₃) carbonate chloride sulphate sodium potassium	10 sites within the catchments, reservoir and command area	Quarterly for the 1st 5 yr of operation. Frequency to be reviewed after 5 yr	FAO standards for irrigation water quality	PRs6,000 per sample PRs240,000/yr	IPD	SEM U

Environmental Component	Project Stages	Parameters	Locations	Frequency	Standards	Approximate cost (PRs)	Implementation	Supervision
Water quality – watershed management	Construction & operation	TSS Stream flow	2 locations upstream of the reservoir and 2 locations downstream of the outflow	Quarterly	Performance indicators as developed for watershed management plan	Cost included as part of the watershed management plan	PMU	Safeguards Unit/SEMU

Ca = calcium; dB = decibel; EMP = Environmental Management Plan; EPA = Environmental Protection Act; FAO = Food and Agriculture Organization; IPD = Irrigation and Power Department; Mg = Magnesium; NEQs = National Environmental Quality Standard; pH = measure of alkalinity; PMU = Project Management Unit; PR = Pakistan Rupees; SEMU = Social and Environmental Monitoring Unit; TSS = total suspended solids

Source: Consultant's Report.

COMMUNITY CONSULTATION MEETINGS RECORD

A. PERSONS MET AND CONSULTED FOR POVERTY AND SOCIAL ASSESSMENT

1. Meetings with Community Representatives

1. Twenty-six members of the project beneficiary communities from Sapial, Makial and Rattarian had been gathered in Sapial village by the key contact person Malik Faeth Sher on 29 November 2006.

Table A2.1: Participants of the Community Meeting with Gravity Irrigation Beneficiaries at Kot Fateh Khan Dam (29 November 2006)

Nr	Name	Village
Gravity irrigation beneficiaries		
1.	Nazir Ahmed	Makial
2.	Mohammad Bashir	
3.	Mohammad Khan	
4.	Atta Mohammad	Rattarian
5.	Malik Mohammad Shair	Sapial
6.	Nawab Khan	
7.	Haji Mohammad Khan	
8.	Mohammad Amin Khan	
9.	Mohammad Yaqoob	
10.	Sajad Hussain	
11.	Rab Nawaz	
12.	Jasim Ali	
13.	Mohammad Aslam Khan	
14.	Sohail Akram Nambardar	
15.	Naveed Akram	
16.	Mohammad Nawaz Khan	
17.	Wahid Hussain	
18.	Ahmed Yar Khan	
19.	Kossar Ali	
20.	Fard Ali Khan	
21.	Raja Tahir Hussain	
22.	Mohammad Mobeen	
23.	Shair Khan	
24.	Bostan	
25.	Mohabat	
26.	Nawab Khan	

2. Twelve representatives of the potential beneficiaries of the planned lift irrigation section of the scheme from the villages Sohal and Thatti Nur Ahmad Shah were gathered on 4 December 2006 by their leader Khezar Hayat.

Table A2.2: Participants of the Community Meeting with Lift Irrigation Beneficiaries at Kot Fateh Khan Dam (4 December 2006)

Lift irrigation beneficiaries		
1.	Malik Khezar Hayyat	Sohal
2.	Malik Awais Nawaz	
3.	Altaf	
4.	Afzal	
5.	Shah Jahan	
6.	Hassan	
7.	Sher Khan	
8.	Ghulam Ali	
9.	Ramazan	
10.	Syed Nazir Hussain Shah	Thatti Nur Ahmed Shah
11.	Syed Imtiaz Hussain Shah	
12.	Sardar Amir Khan	

3. In both meetings the communities were briefed about the purpose of the visit of the team of social researchers (the study of socio-economic, gender and resettlement issues through PRA exercises), as well as the components and related activities of the sub-project, including watershed management, dam construction, command area development and land acquisition and resettlement. The opportunity and need for community participation in the planning, implementation as well as monitoring and evaluation of the project was stressed. Community concerns regarding the subproject components and related future tasks, as well as community participation were discussed in detail. The concurrence of the community with the team's PRA program was sought and obtained.

4. The community members were reluctant and skeptical about the formation of a community project consultation committee to enable their participation in project planning, implementation and M&E. The communities requested to be provided with more information in writing, including maps, canal alignment, and the extent of the irrigated areas of the different villages. They wish to communicate with representatives of the SDO.

5. Key informant interviews were carried out with community leaders Mohammad Bashir, Raja Tahir Hussain, Malik Fateh Sher and Khezar Hayat between 29 November and 4 December 2006.

6. Four focus group meetings with men and three with women were convened between 30 November and 4 December 2006:

- (i) Men from households with various income levels and property sizes in Makial: Shoukat Hayat Nambardar, Mohammad Nisar, Mohammad Ashraf, Mohammad Ejaz, Saddullah Khan, Mohammad Sarfaraz, Mohammad Mushtaq, Mohammad Anayat, Mohammad Reyaz, Shair Khan, Mohammad Ashraf, Mohammad Bashir
- (ii) Women who are workers, teachers and wives of land owners in Makial: Samina Gul, Naseem Akhtar, Nasreen Bibi, Rukhsana, Ruqaya, Imtiaz Begum, Kaneez Bibi, Shaheen Akhtar, Meena
- (iii) Male landowners in Sapial: Javed Iqbal, Fateh Khan, Sarim Hussain, Nawab Khan, Mobeen, Malik Fateh Shair, Amir Taimoor, Raja Afzal
- (iv) Women from households with various income levels and property sizes in Sapial: Naima Rizvi, Nuzhat Parvin, Nusrat Parveen, Shakra, Asma Parveen, Sakina Bibi

- (v) Male workers and tenants in Rattarian: Mohammad Yaqoob, Akram Khan, Noor Mohammad, Riaz Ahmed
- (vi) Women workers and teachers in Rattarian: Abida Parveen, Muneer Begum, Aasma Banu, Madiha, Rehana Ali, Kausar, Mukhtyar Bibi
- (vii) Male landowners and tenants in Sohal: Malik Khezar Hayyat, Malik Awais Nawaz, Shah Jahan, Sher Khan, Ghulam Ali, Ramazan, Syed Nazir Hussain Shah, Syed Imtiaz Hussain Shah, Sardar Amir Khan.

7. In Makial the respondents appeared to persistently overestimate their numbers as if they sought to appear larger in order to enhance their claim to a larger command area.

8. Key community and development priorities mentioned were:

- (i) Scarcity of water for cultivation and drinking
- (ii) Agricultural land development
- (iii) Poverty
- (iv) Unemployment
- (v) Scarcity of fuelwood
- (vi) Lack of health care facilities
- (vii) Inadequate schools
- (viii) Unsanitary conditions
- (ix) Inadequate road connections

9. The highest priorities (water scarcity, land development, unemployment) are all within the scope of the project. In Sohal, Rattarian and Thatti, the respondents also clearly indicated their demand for irrigation facilities, water supply and command area development during their greetings and opening statements preceding the focus group discussions. The project thus responds to a perceived and clearly articulated need at this sub-project site.

10. The impact of the project was generally perceived as positive, with anticipated benefits such as irrigated land, cash income from improved cash crop cultivation, higher and more reliable yields from staple crops and employment from labor intensive cultivation. Within the prevailing structural social relations, laborers and small tenants would gain benefits through the availability of increased employment, tenancies and yields. In irrigated cash crop agriculture with intensified cultivation, the length of employment periods would be increased.

11. Among the female respondents, expectations were high about the availability of safe drinking water for people and livestock, as they deal with the problems resulting from saline or contaminated water sources and the difficulties arising from water scarcity or inaccessible water supply on a daily basis.

12. A central concern for the future irrigators is the reliable and sustainable development of their command area. Although the villagers who were frequently consulted expressed their willingness to adopt new agricultural practices, invest their financial means in agricultural inputs and make project contributions in the form of cash or labor, they also recognized their limitations and expressed a need for financial and organizational support. In particular the cost of land leveling and watercourse development will require access to long-term credit, to ensure that these investments are not delayed and dragged out over long periods of time. Furthermore, the cultivators have observed the difficulties of farmers in other small dam projects in mobilizing the support of the Soil Conservation and On-Farm Water Management Departments to level their land and construct watercourses. The respondents also expressed concern about their limited

capability to afford new and additional agricultural inputs, including irrigation fees, needed for successful cash crop cultivation.

13. Therefore, it was argued repeatedly and insistently, that the success and sustainability of the project would depend on the inclusion of these measures under the command area development component of the project. The farmers argued that this should under no circumstances be left to the line agencies until after the completion of the project.

14. A further twenty five water supply schemes established during the past years under the ADB funded Water Supply and Sanitation Project of Public Health Engineering Department (PHED) are located downstream of the proposed dam. These include the schemes for Sapial and Makial. In addition, the town of Pindi Gheb, various villages all depend on the normal stream flow of the Dotal Khas, eventually Sil River, for their water supply. It will be imperative to maintain the normal base flow of the river to ensure the continued viability of these schemes. The anticipated rise in groundwater levels due to the ponding of water in the reservoir may actually augment the yields of some water supply schemes, all of which depend on the subsurface flow of the river. Under no circumstances should the base flow be impede to secure additional irrigation water, as this would adversely affect a large number of downstream water users and violate the policy priority of domestic water supply over irrigation supply.

15. The understanding of and interest in developing new income generation options was more limited among the poorer segments of the beneficiary community interviewed. Among poor women in particular, dairy development was the only interest stated, as this is a common and widely known activity, which is culturally appropriate for women and proven to generate cash income.

16. The beneficiary villages of the Kot Fateh Khan Dam communicated their reluctance to form a community project consultation committee. Their wait-and-see attitude appeared to be rooted in skepticism about the usefulness of committees formed for development activities and about the likelihood that the dam and irrigation system would actually become a reality.

B. FARMERS INFORMED ABOUT THE PROJECT IN INTERVIEWED FOR THE FARM SURVEY

17. In the context of irrigated agriculture development planning, a farm survey was conducted among farmers, respondents are listed in Table 3. The subproject was introduced and data were solicited on farming practices in order to assess the potential for irrigated agriculture development.

18. The respondents reported water as a key constraint in agriculture production and as such the Kot Fateh Khan Small Dam project is welcomed and it addresses a real need. They asked for support for field and water courses development, as well as for input supply and access to appropriate production technology. Farmers rated the present assistance from extension services and input supply as low in terms of availability and affordability. For this reason they very much welcome the irrigation project that would alleviate the water constraint and the component on irrigated agriculture development.

Table A2.3: Farmers Contacted for the Command Area Programming

Nr	Name	Village	Month
301	Allahyar Khan	Rattarian	December 2006
302	Ghulam Hussain	Rattarian	December 2006
303	Fazal Elahi	Rattarian	December 2006
304	Mohammed Khan	Rattarian	December 2006
305	Rashan Din	Rattarian	December 2006
306	Sultan Mohammed	Rattarian	December 2006
307	Mohammad Din	Rattarian	December 2006
309	Mohammed Saeed	Rattarian	December 2006
310	M. Ayub	Rattarian	December 2006
311	Hafiz ur Rehman		December 2006
312	Mohammed Aksar	Dhoke Rakh	December 2006
313	Aslam Khan	Dokhe Rakh	December 2006
314	Aksar Khan	Dhoke Chab	December 2006
315	Sher Khan	Dhoke Rakh	December 2006
316	M. Qasim	Dhoke Chab	December 2006
317	Noor Zaman	Dhoke Chab	December 2006
318	Mohammed Din	Dhoke Chab	December 2006
319	Kosar Ali	Sapial	December 2006
320	Razaht Ali	Sapial	December 2006
321	M. Mobin	Sapial	December 2006
322	Modassar Abbas	Sapial	December 2006
323	Mamriz Khan	Sapial	December 2006
324	M. Amin	Sapial	December 2006
325	Raja Feroz	Sapial	December 2006
326	Nisar Khan	Sapial	December 2006
327	Mohammad Bashir	Sapial	December 2006
328	Mazar Khan	Makial	December 2006
329	M. Aksar	DK Rakkhan Wali	December 2006
330	Warasas Khan	DK Rakkhan Wali	December 2006
331	Mohammed Saleem	Sapial	March 2007
332	Ahmad Yar Khan	Sapial	March 2007
333	Abdul Khaliq	Sapial	March 2007

C. PERSONS MET AND CONSULTED BY THE WATERSHED DEVELOPMENT TEAM

19. The field teams for Watershed Development contacted 15 villages to inform the communities about the envisaged project, the aim to prepare and implement a watershed development plan, to assess development priorities and potential for watershed conservation measures. The list of villages and the persons contacted are shown in Table 4.

20. The following development priorities were frequently mentioned by the respondents:
- (i) Development of mini-dams and ponds for livestock, agriculture and other purposes
 - (ii) Bulldozer services for land development
 - (iii) Veterinary hospitals

- (iv) Basic Health Units for humans
- (v) Schools and education facilities
- (vi) Road improvement.

21. The Women also expressed strong interest in vocational training and in income generating activities.

22. There was less awareness about the need for soil conservation measures in the watershed although in the people in Sohal and Dokh Nautheh that soil conservation works are important in the context of mini-dam projects, thus demonstrating awareness of the need for such measures in the context of water storage projects.

Table A2.4: Officials and Institutions Contacted by the Watershed Development Team

	Location	Persons Met	Comments
Mon 27 Nov	Islamabad/Rawalpindi	Muhammad Naseer Ahmad Conservator of Forest Dr. Sarwat N. Mirza, Range Management, University of Arid Agriculture, Mr. Syed Moassam Nizame, Asst. Prof. Mr. Malik Abdul Sattar, Direct Soil Conservation; Mr. Abdul Rahman, Soil Conservation Engineer	Department of Forestry, University of Arid Agriculture, Soil Conservation Directorate
Tue 28 Nov	Chakwal	Dr. Abid Mahmood Awan, Director, Mr. Aamir Mahmoodi, Agric. Engineer	Barani Agriculture Research Institute
Wed 29 Nov	Attock	Mr. Raja Tariq Mehmood (DFO), Mr. Mohammad Ali Malika (D. Wildlife Officer); Mr. Azhar Qadir, Asst. Director BVDP, ABAD.	Divisional Forest Officer, Wildlife Officer and Agency for Barani Agricultural Development Dokh Tarbathi, Minidam of Mr. Mohammad Yassin.
Thu 30 Nov	Kot Fateh Khan	Mr. Mohammad Ramzam, Forester. Lund: Mr. Jabul Sind, School Teacher	Reconnaissance of the Kot Fateh Khan Watershed, different villages, Kot Fateh Khan, Dhulian, Kanjur Dam, Lund, Doria
Fri 01 Dec	Chakwal	Mr. Rashid (Director SAWCRI), Mr. Amin (Water Management)	Soil and Water Conservation research Institute
Fri 16 Feb	Attock, Fateh Jang	Mr. Jameel Abmal Kha (SDFO Pindi Gep), Mr. Samir Ahmad Khan (NRSP Project Officer), Mr. Aftab Shah	Attock DFO, office
Tue 27 Feb	Chakwal	Dr. Rasheed and staff	SAWCRI, discuss possible cooperation on WS
Sat 3 Mar	Islamabad	Mr. Malek Sattar (Director), Mr. Rahman (Soil Scientist), Mr. Bashir (Agronomist), M. Mohammad Ashek, Dept Dir. Water Resources. Mr. Sadiq Gul (retired Soil Scientist)	Soil Conservation Department
Tue 20 Mar	Attock	Attock: Mr. Muzammal Hussian Tarar, Agricultural Engineer, Attock	Soil Conservation measures in Attock district, in particular field leveling and minidams/ponds
Thu 22 Mar	Lahore	Meeting attendants from SDO, Forestry, Agriculture	Presentation and meeting on project implementation concept
Fri 23 Mar		Mr. Rustam Khan, Haji ; Muhammad Din (Naib Nazim Kot Fateh Khan UC, Kamra)	Kot Fateh Khan, Kamra, Dam Site, Bhuwala

Table A2.5: Villages Visited and Informed about Kot Fateh Khan Sub Project for Watershed Development Planning

Nr.	Village	Union Council	Date	Men	Women
1	Kot Fateh Khan	Kot Fateh Khan	20/02/2007	Nazim Tanweer Hassan Shah Rustam Khan, Molik Altaf (councillor), Mastan Shah Nawaz, Seth Rustam Khan	Mrs. Nazim Tarin Hussain S. Rah, Fatima Bibi Guwilla
2	Lund	Dhurnal	21/02/2007	Ahmad Khan, s/o Nawabuhan Bashir Nubar Dan, Jabai Hussain	Miss Shah Naz (Teacher of Gvt Girls School)
3	Bakhuwala	Ahmadal	22/02/2007	Baz Khan s/o Ghulan M. Khan Numbardan, Zafar Iqbal s/o Fazal Dad Ghulam Abbas, Mohammad Afzal	Anwar Sultan, Nur Bhari Nadia, Zakia
4	Dalial	Dhurnal	22/02/2007	Altaf Hussain, Sja Habibuha, Mohal Khan s/o Badullah, Mohammad Pervez	Tasawa Shazia, principal Bismillah Publ. School
5	Sadrial	Dhurnal	24/02/2007	Malik Prasat Ali, Karam Khan, Sher Zaman, Mohammad Bashir	Nargis, Lady Counsellor, Bhag Bharri
6	Dewal	Dhurnal	25/02/2007	Master Mihal Iqbal, Ghulam Husain, Haveladan M. Rmazan, Mohad Shafique	Tahira Naseen, Teacher, Misri Bano, Shah Jehan, Warwar Sultan
7	Tatti Noor AS	Akhlash	26/02/2007	Asif Khan s/o Ghulan Mohd, Master Arshad, Ghulam Mohd s/o Jehan Khan, Noor Alam s/o Noor Ahmed	Miss. Rabab + Gulma Fatima
8	Sohal	Akhlash	27/02/2007	Lal Zamarat Khan, Habib Khan, Mohammad Akhtar, Mohd Solain, Sahidlal Jan	Gul Bibi, Zarkhata
9	Nathial	Akhlash	27/02/2007	Haji Mohd Alam, Abdu Rauf (teacher), Abdul Qadus s/o Sher Mohd, Mohd Arau s/o Cal Khan	Shabnan, school teacher, Mumtaz Begum, councillor
10	Kamra	Kot Fateh Khan	01/03/2007	Naiz Nazim, Mohd Din, 2 councillors, Muzzafar Khan, Riaz Hussain, Numbar Dar	Shifa Bibi, school teacher
11	Dok Durian	Kot Fateh Khan	04/03/2007	Mohd Riaz, Haji Saifullah, Mohd Amir, Amin Baz	
12	Jhandial	Dhurnal	02/03/2007	Taj Mohd Khan, Hayat Mohd, Amin Mukhtar, Lal Khan, Ghulan Mohd	Ishrat School Teacher
13	Dokh Nautheh	Dhurnal	02/03/2007	Mohd Amin, haji Fazal Khan, Jehangir Khan, Mohd Sher	
14	Gadda	Gulyal	03/03/2007	Mohd Banaras, Mohd Tariq, Abdul Khaliq (master)	Khanam Jan, Nazira Begum, Irshad Begum, Shaheen Akhtan
15	Dhok Kiran Wali	Gulyal	04/03/2007	Zamin Ahmad, Mohammad Iqbal, Ashraf Razaqat, Akhtar	Arfina Bibi, Zarmina Bibi, Mira Bibi